NCDOL INDUSTRY ALERT
Division of Occupational Safety and Health

Combustible Dust: A Major Hot Work Hazard

Three contract welders received second- and third-degree burns after a flash fire broke out in a silo that had been used to store wood flour. The welders were torch cutting and welding on the silo to attach a side chute. The silo had not been thoroughly cleaned, and according to witnesses, wood dust was falling onto the floor while work was being performed.

The investigation showed the contract welders were unaware of the hazard created by the residual dust within the silo, that an effective fire protection and prevention plan was not in place, and a hot work permit was not issued before beginning work. In this incident the workers were fortunate. Although there was enough fuel dust for a flash fire, there was not enough for a catastrophic explosion.

Dust fires and explosions are preventable. Operators can prevent these fires by knowing what conditions spark these catastrophic explosions. Five factors contribute to a volatile environment that can lead to an explosion—oxygen, a fuel, ignition source, dust dispersion and confinement.

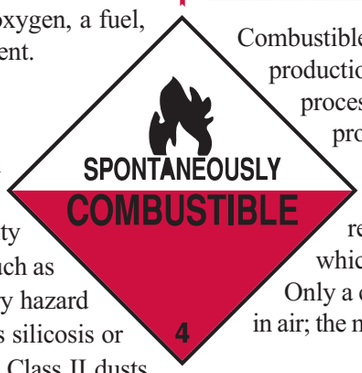
Dust Is a Hazard

Dusts pose a variety of hazards, some of which we are more familiar with than explosivity. Common hazards may include reduced visibility and slippery surface conditions. Some dusts such as asbestos and silica present a serious respiratory hazard and can cause long-term health effects such as silicosis or asbestosis. Combustible dusts are identified as Class II dusts. The variety of combustible dusts makes it difficult for a brief discussion. Areas within facilities where combustible dusts are manufactured, processed or produced are considered Class II locations according to the National Electrical Code. Class II locations require electrical equipment approved for that type of location.

Dust Hazards Can Be Found in N.C.

North Carolina is home to many industries and locations where the hazard of combustible dust can be commonly found. These include:

- Wood processing and furniture manufacturing
- Grain elevators, bins and silos
- Flour and feed mills
- Manufacture or storage of metal powders such as magnesium and aluminum
- Chemical production
- Plastic production
- Starch or candy producers
- Spice, sugar and cocoa production or storage
- Coal handling or processing areas
- Pharmaceutical plants
- Dust collection bins or bags
- Overhead beams, horizontal surfaces, inside of equipment and above false ceilings



Combustible dusts can be generated in various parts of the production process. Explosions can occur within any process where a combustible dust accumulates, is produced or stored, or is airborne. A variety of energy sources can trigger a dust explosion. The severity of the resulting explosion is related to the rapid burning of dust particles, which leads to the rapid release of energy (as heat). Only a couple of these dust types spontaneously ignite in air; the majority of them need another source of ignition.

Possible ignition sources include:

- Open flames (welding, cutting, matches, etc.)
- Hot surfaces (dryers, bearings, heaters, etc.)
- Heat from mechanical impacts
- Electrical discharges (switch and outlet activation)
- Electrostatic discharges
- Smoldering or burning dust
- Cigars, pipes and cigarettes

Hazard Assessment

A thorough hazard assessment is essential to identify and eliminate factors contributing to dust fires and explosions. Ask yourself questions such as the following when you consider working at your facility or another facility where you may perform hot work activities such as welding, cutting or grinding.

- Have you been informed of any unusual hazards that may be present in the area?
- Has an assessment of the worksite been conducted to determine if hot work activities could create a fire or explosion hazard?
- Has a hot work permit been issued if necessary, before beginning work?
- Has the area been adequately cleaned of residual combustible dust?
- Is vacuuming used whenever possible rather than blowing or sweeping combustible dust?
- Are the electrical equipment and tools used in the area